Transcatheter Aortic Valve Implantation @NUHCS

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The 18th ASEAN Congress of Cardiology was held in the beautiful city of Cebu, Philippines, from 1–3 December 2010. The theme this year was “Confronting Challenges in Cardiovascular Care: An ASEAN Perspective”. NUHCS was well represented in this conference.

Dr Chai Ping gave a lecture on CT Coronary Angiography and Cardiac MRI in management of CAD, and shared on the Heart Failure Clinic: The Singapore Experience. A/Prof Tan Huay Cheem gave an update on Treatment of Left Main and Multi-vessel Disease: PCI vs CABG. Prof Mark Richards spoke on Advances in Cardiac Markers for Heart Failure. A/Prof Poh Kian Keong chaired a session on Cardiac Rehabilitation and was one of the judges in the Most Outstanding Original Research competition. A/Prof Quek Swee Chye gave an update on New Strategies in the Post-operative Management of complex Congenital Heart Disease.

I was honoured to represent Singapore in the Young Investigator’s Award, and our presentation on “The Relation of the Index of Microcirculatory Resistance to Indices of Microvascular Perfusion and Cardiac Injury Following Primary Angioplasty for ST-Segment Elevation Myocardial Infarction” was awarded the 1st prize. One representative from each of the six countries including Malaysia, Indonesia, Philippines, Vietnam and Thailand participated in this competition.

It was good to have met up with cardiologists from Singapore and the region, and especially catching up with former fellows who have trained in our centre, exchanging ideas and sharing experiences in research and clinical practice. Particularly delightful was the extremely warm reception of the doctors from Philippines, the host country. The hospitality was unmatched, and culminated in the Gala Night where we were all treated to a banquet complete with cultural, song and dance performances.
NUHCS started to provide Cardiology service at Jurong General Hospital (JGH) – presently at the site of the old Alexandra Hospital – since 28th June 2010, when the team from Alexandra Hospital moved to the new Khoo Teck Puat Hospital (KTPH) in Yishun. It has since been an invaluable experience as I witnessed and participated in the setting up of a new Cardiology service at JGH.

In the fledgling stage, we provided core essential services, which encompassed inpatient consult and non-invasive cardiac laboratory services. Our team provided cardiac care not only to patients in the general ward but also to patients in the intensive care unit and emergency department. With only two technicians on board, we were coping with the hospital’s demand on echocardiography, ambulatory holter and blood pressure monitoring services.

As with all new services, teething issues were inevitable. Our Cardiology team at JGH, which includes Dr Edgar Tay (Director of Clinical Services at JGH), cardiac registrars from NUH and myself, constantly reviewed and improved the workflow to ensure optimisation of care and coordination of cardiac services at JGH. We started the telemetry service in JGH since August 2010. In September 2010, we had an addition of a new echocardiograph technician. This enabled expansion of our echocardiography service.

Currently, JGH patients requiring cardiac services such as coronary angiography, interventional procedures, and cardiac imaging (e.g., cardiac MRI, nuclear cardiology imaging and CT coronary angiography) are transferred seamlessly to our main campus in NUH, thanks to the coordinated efforts of staff from both hospitals.

As the Cardiology service at JGH continues to expand and embark on setting up new cardiac services, I am certain that this will transform into a patient-oriented healthcare service for our increasing population of cardiac patients.
Drug-eluting balloon (DEB) has emerged as the latest breakthrough technology in the endovascular treatment of patients with significant coronary artery disease. Since the mid-1990s, implantation of coronary stent (metallic scaffold prosthesis) has become the standard treatment in most cases of percutaneous coronary intervention (PCI). While stents prove to be a significant advance in reducing the frequency of restenosis by eliminating elastic recoil and negative remodelling, it has created new problems such as promoting neointimal formation which results in in-stent restenosis (ISR). This can occur in about 20%–30% of patients, particularly those who have diabetes mellitus, renal impairment, multivessel PCI.

The introduction of drug-eluting stents (DES) since 2003 has been effective in reducing restenosis between 50%–70% and the need for repeat intervention procedure by 20%–30%. Drug-eluting stents comprise usual bare stent platform with coatings of antiproliferative drugs such as sirolimus or its analogue and paclitaxel to inhibit intimal hyperplasia. The drugs are embedded in permanent polymer in the first generation DESs or biodegradable polymers in the later generations. It is gradually emerging that ISR can still occur in patients treated with DES, particularly those who are at high risk for complications such as multivessel disease or diabetes mellitus. Also, DES deployment may be complicated by late stent thrombosis, albeit low in incidence, with associated high mortality and morbidity.

The advent of DEB provides an alternative means of drug-delivery into the coronary artery. Its non-stent-based local drug delivery could fulfil the goal of DES without the attendant issues associated with the latter. The potential advantages of DEB include:

1. A homogenous drug transfer to the vessel wall and not only to the areas directly covered by the stent strut
2. Highest concentration of drug is delivered to the vessel wall during balloon inflation at the time of maximal injury. This will help to inhibit the neointimal process which is most vigorous then and allow for reendothelialisation thereafter
3. Absence of stent allows for preservation of original anatomy and hence help diminish abnormal flow patterns associated with stent implantation
4. Absence of stent polymer reduce the stimulus for chronic inflammation which may be a trigger for late thrombosis
5. Reduced need for prolonged dual antiplatelet therapy. DES requires at least a year of dual aspirin and clopidogrel antiplatelet therapy whereas DEB only need a month of combined therapy.
6. DEB allows for local drug delivery which can be applied in situations where stents are not to be used or when prolonged antiplatelet therapy is not desirable because of patient’s increased bleeding risk.

There have been several DEBs manufactured and made available for commercial use. All of these DEBs have chosen paclitaxel as the drug of choice for local delivery. This is because the drug is highly lipophilic which can be easily absorbed by the arterial tissue, rapidly uptake by the intima to compensate for the short contact time, has high retention rate and sustained drug effect. Paclitaxel is an antitumour drug that acts by stabilisation of the cellular microtubules, thereby reduces cellular functions like proliferation and migration.

Following its introduction in Singapore in 2007, there have been significant interest in the use of DEB among interventionists. DEB has been demonstrated in various clinical trials to be effective in treating ISR where the main pathophysiological mechanism is one of neointimal hyperplasia. DEB is found to be superior to conventional balloon angioplasty and non-inferior to DES in treating ISR. Our institutional experience with the use of
NUHCS was invited to carry out a ‘live’ transmission of complex percutaneous coronary intervention to the Bangladesh Interventional Cardiology meeting organised by the National Heart Foundation Hospital and Research Institute, Dhaka, on 2nd December 2010. Two cases of complex coronary cases were performed ‘live’ to an interactive audience of experts and cardiologists. This is the tenth time that NUHCS has been invited for such ‘live’ transmissions over the last five years. The session was carried out expertly by the experienced NUHCS team of interventional cardiologists and supporting staff with good feedback response from the organiser and attending audience.

DEB in patients with ISR showed a target lesion revascularisation rate of 7% (compared with usual rate of 40%–50% in the treatment of this high risk lesion with normal balloon angioplasty). There was no incidence of stent thrombosis despite the use of dual antiplatelet therapy for only one month in our cohort of practice. The data was presented at the American Heart Association meeting held in Chicago, USA, this year. Other applications for the use of DEB include treatment of side branch in bifurcation PCI, small-calibred vessel, long lesion, lower limb arteries stenoses, and conditions where prolonged antiplatelet therapy is not desirable.

Local non-stent-based drug delivery with DEB has proven to be feasible and effective in certain patient subgroups. Paclitaxel coating appears to provide the best results presently. More clinical randomised trials are needed to fully evaluate the role of DEB in modern PCI. One of which is a multicentre trial called the ASIAN DIOR registry led by NUHCS which involves 14 international centres which will provide information regarding the biologic efficacy and safety of the DIOR® drug-eluting balloon.
Every year, the Society for Vascular Surgery in USA (SVS) offers four outstanding young vascular surgeons around the world an international scholarship to visit elite medical centres in North America and participate in the society’s annual meeting. I am very honoured and grateful to be elected as one of the awardees.

This journey lasted six weeks and I had visited five prominent centres: University of Washington, Methodist Hospital, Yale University, Cleveland Clinic and Johns Hopkins University Hospital. Here are some of my wonderful experiences and memories.

I met with world renowned expert in vascular smooth muscle cell, Dr Alexander Clowes, in the University of Washington. From his life story as an academic surgeon, I learnt the important of perseverance, collaboration and linking scientific research to clinical problem-solving. Dr Benjamin Starnes showed me their success of building up emergency stent-graft service for aortic diseases which drastically improved patients’ mortality.

I visited Dr Alan Lunsden in the Methodist Debakey Heart and Vascular Center. He is one of the pioneers performing endovascular procedures. He and his team perform wide varieties of endovascular and hybrid procedures for various vascular diseases. The setting of the Methodist hospital is amazing to me as the facilities of the institution are totally structured to be patient-friendly and clinical service facilitating. Staff working there are happy and energetic. The hospital also takes pride in being one of Fortune magazine’s 2010 “100 best Companies to Work For”. There are 1,000 beds in the Methodist hospital but >70 operating theatres. This high theatre to hospital bed ratio should be a new standard for a modern era where surgical procedures are becoming less invasive and post-operative stays becoming much shorter. The turnover of patients depends very much on the availability of surgical and interventional services.

Yale is one of the oldest universities in the USA but the service organisation of vascular surgery is one of the most forward-thinking. Under the vision of Dr Bauer Sumpio, chief of vascular surgery and Dr John Aruny, chief of intervention radiology, the two departments combined into one. The two parties work together on major cases, share all the facilities, meet with one another to discuss patients’ management frequently. Instead of being competitors, they work together in a win-win manner and provide the best service to their patients.

During my visit, there were three other Asian vascular surgeons visiting Yale – Dr Kim from South Korea, Dr Yan from Taiwan and Dr Kittipan from Thailand. Dr Bart Muhs was our host. We had a very enjoyable discussion and exchange of experience. From there, we decided to organise a video-conference between Yale, Singapore, Korea, Taiwan and Thailand on a regular two monthly basis.

The 2010 Vascular Annual Meeting was held in Boston, Massachusetts, with 3,000 delegates attending. The session that impressed me most was the presidential address delivered by Dr Sidawy. His words were down to earth, practical and yet thrilling to heart. He quoted the encouraging slogan “BAHG” (Big Hairy Audacious Goals) from “built to last” to...
illustrate his insight on how the society and vascular surgery as a whole should progress. I enjoyed every second of the presidential address and congratulate the society of having such a visionary president.

Cleveland Clinic is one of the few centres in USA that perform fenestrated and branched stent-graft procedure to treat sophisticated aortic disease patients. There, I visited the state-of-the-art hybrid endovascular theatre. The theatre carries Siemens fluoroscopy machine with a robotic arm that can reach the carbon operating table at all sorts of angles.

The software that accompanies the fluoroscopic machine is capable of marking the location of aortic branches based on the CT scan information. There are three 62-inch large monitors to display clearly the fluoroscopic images side by side with reformatted images. I observed several four visceral branches fenestrated stent-graft repairs and fully appreciated the skill and endurance of the faculty members performing these procedures.

Dr Julie Freischlag of Johns Hopkins University Hospital had given me a completely different insight into the treatment and management of thoracic outlet syndrome. Besides being a successful vascular surgeon, she is also an excellent Chief of Service leading a surgical department with a prominent history. Under her leadership, the Johns Hopkins Surgical Department recorded major expansion both in service and manpower even during the period of devastating economic turmoil of the USA. Dr Freischlag puts tremendous emphasis on “People”. She frequently meets with staff in both formal and casual settings, conducts staff burnout questionnaires to understand their stress and problems, helps in raising endowment funds to support faculty members’ research development and participates actively in staff recruitment.

The surgery department of Johns Hopkins also puts lots of effort in training nursing specialists and physician assistants. Their nurse specialists and physician assistants are dedicated, knowledgeable, skilful and play a vital role in clinical service. Enhancing nurses training and empowering their autonomy to provide quality service would be the direction to go for all advanced centres.

The visit to these five elite hospitals and the participation of the SVS annual meeting was an absolutely wonderful experience. I am deeply inspired by the great people I met, the fantastic organisation of service and the advanced technology I came across. It also sparked a start of communication and collaboration between NUHS and some major USA medical centres.
NUHCS’ Journey to JCI Reaccreditation

Dr Teo Swee Guan

The first week of August 2010 was an intense and exhilarating period for NUHS as much as it was rewarding. It was the Joint Commission International (JCI) recertification exercise. While continuing evaluation and improvement in patient care is an integral part of our work culture, this exercise represented an opportunity to review and critique our processes in clinical, workflow and research areas.

A small committee comprising key representatives from operations, invasive and non-invasive cardiology services and wards was formed. The team conducted impromptu “walkabouts”, visiting various patient care areas under typical working conditions to identify deficiencies on the ground. These were then analysed in detail and potential solutions were discussed with the respective clinical directors and nurse managers. We surprised ourselves with the amazing alacrity with which these knotty issues were ironed out—in a matter of weeks rather than months, owing in no small part to the enthusiasm and support at all levels.

The primary motivation for our efforts was patient safety, and the JCI reaccreditation proved to be an efficient catalyst. With the help of the JCI committee, many initiatives were implemented and adopted very expeditiously. As a clinician, I found the entire experience both refreshing and enriching. Through it, I realised that our nursing colleagues are light years ahead in delivering good, consistent and compliant protocol-driven patient care, which is the very heart of the JCI philosophy. In fact, a good proportion of the solutions for clinical workflow issues stemmed from our nurses.

Let us all remember that vigilance in protocol compliance and attention to patient safety is not a “one-off” exercise merely for JCI accreditation, but rather a philosophy to be applied everyday in our working lives.

Regular updates were conducted at departmental meetings and dedicated lecture slots were organised to align the rest of the medical staff with the proposed changes. With most humans being creatures of habit, these (sometimes radical) changes required a paradigm shift and alteration of mindset for many of our colleagues; but we were greatly encouraged that they rose to the challenge and took these in their stride.

During the JCI audit, visits were made by the external accreditation team to Ward 63, Coronary Care Unit and Angiography Centre. Cardiac case notes were reviewed retrospectively up to a year. An interventional cardiologist was also selected for audit against international benchmarks in terms of outcomes and procedural complications.

Through it all, I am glad to report that “We did it!” Our successful JCI reaccreditation is the result of the collective effort of the entire hospital staff.

A positive “fringe benefit” of this exercise is that it has given us the impetus and opportunity to do some “spring cleaning” of our work processes. For example, one of the hitherto unaddressed issues is that of the standardisation of monitoring for sedation. It is imperative that we continue to work hard to solve these issues and improve on our patient care. Let us all remember that vigilance in protocol compliance and attention to patient safety is not a “one-off” exercise merely for JCI accreditation, but rather a philosophy to be applied everyday in our working lives. As Chairman Medical Board, NUH, once said, “Everyday is a JCI day.”
National University Heart Centre, Singapore (NUHCS), welcomed the visit of the International Advisory Panel (IAP) once again on 8th–9th November 2010 to help with strategising and charting the direction of the development of the Centre. This is the second visit by the IAP members following their first on 3rd–6th March 2008, when the formation of NUHCS was shortly announced by the Ministry of Health. Comprising three internationally renowned academicians namely Prof Judith Swain, Executive Director, Singapore Institute for Clinical Science; Prof Elizabeth Nabel, President of Brigham and Women’s Hospital; and Prof Bruce Reitz, Chief Emeritus, Department of Surgery, Stanford University; they were updated on the progress of the developments NUHCS made over the past two years by NUHCS senior leaders led by A/Prof Tan Huay Cheem, Director, NUHCS. During the two days of intensive meetings, the IAP also met senior leadership of National University Health System (NUHS) led by Prof Benjamin Ong, Chief Executive; and also Director of Cardiovascular Research Institute, Prof Mark Richards, whom they met for the first time. The IAP sought input from various NUHCS doctors, including those who are research-intensive, clinical-intensive and Cardiology & cardiothoracic surgical trainees.

Evidently pleased by the progress NUHCS made over the last two years, the IAP commended the staff for their achievements. Further action plan to pursue and realise NUHCS’ vision of becoming a world-class academic medical centre will follow after the IAP has completed its full report and recommendations.
On the 11th of September 2010, One Heart Mass CPR 2010 was held at the amphitheatre of VivoCity. The event was organised by the Singapore First Aid Training Centre (SFATC), and jointly supported by NUHCS and our colleagues from NUH Business Development.

90 members of the NUH staff were present at the event, of which, 31 of them were facilitators while 59 of them were participants. Our 31 facilitators arrived early on the morning of the event and without a break, prepared goodie bags, pumped up over a thousand Charles inflatable CPR manikins and helped with setting up the grounds for the event.

As the event began, almost 1,000 participants took their places at the VivoCity amphitheatre and learnt the techniques of CPR. Our cardiovascular nursing staff took stage as demonstrators and guided participants who were not familiar with the CPR routine. A few rounds of CPR training later, our participants were ready to make the record. After five cycles, the record for the most number of people doing CPR at the same time was entered into the Singapore Book of Records!

All participants were given recognition for their effort – their names were inscribed on a “Wall of Participation” at the event. This wall was displayed at the NUH Main Building lobby after the event.

We would like to take this chance to thank all who had taken time off to join us at this event, especially those who had volunteered as facilitators at this inaugural event!

“Most people don't realise that in a cardiac arrest situation, the everyday bystander is far more important than any paramedic or doctor that arrives later, simply because they can provide help when it really counts.”

Abdul Rasheed Doad
Founder and Director of the Singapore First Aid Training Centre

Happy faces from NUHCS and NUH among the masses at the record-breaking event

Ms Clarice Lim, Manager of NUH Business Development, receiving a token of appreciation from Mayor Zainudin Nordin

NUHCS PULSE | 10
Mr Cheon Se Kyu travels to Singapore from Korea every six months for his consultation sessions with A/Prof Tan Huay Cheem.

What led him to come to Singapore?
Seven years ago, Mr Myeong came to Singapore to visit his daughter who was working here. Without any warning, Mr Myeong suffered from a massive heart attack. He was promptly sent to the Emergency Department in Alexandra Hospital, and was then transferred to NUH.

He was told by the doctors at NUH that his chance of survival was a mere 1%. An operation was immediately arranged for him. A/Prof Tan was the doctor who had operated on him.

Eight days later, he regained consciousness.

“I will never forget A/Prof Tan and NUH for saving my life.”
Since then, Mr Myeong has been returning to NUH for his bi-annual check-up and medicine collection, Mr Myeong says that although the medical standards in Korea are as good as what Singapore has to offer, but he returns to Singapore because of the fantastic patient after-care services. During his stay in NUH, the doctors and nurses were extremely friendly and attentive to his needs.

Mr Myeong repeatedly mentioned how he is extremely grateful to A/Prof Tan for saving his life and how NUH has given him another chance to live again. He says that should any of his friends require medical attention, he would surely suggest for them to come to NUH for treatment.

Mr Dony Dolf Djakaria was referred to NUH by his doctor in Indonesia as he needed surgery for his existing heart condition. I spoke to Mr Djakaria’s daughter for his interview due to our language barrier.

What happened when you arrived in Singapore?
Upon arrival in Singapore, Mr Djakaria saw A/Prof Tan Huay Cheem for his first consultation. After which he received an angiogram which showed that he had three blocked arteries. He was then referred to Prof Michael Caleb.

Prof Michael Caleb performed surgery on two of his blocked arteries as the third artery was damaged. He was only warded for one week after his surgery and he had a quick and good recovery.

“Everyone was very kind and caring towards me. When I was resting in the wards, the doctors and nurses were kind and helpful.”

Mr Djakaria and his family are very thankful for the care and attention that led to his speedy recovery and his good health progress so far.

Ambassador Sabihuddin Ahmed was looking healthy and well when I met him merely two weeks after his coronary artery bypass surgery. He was here for his follow up consultation with Prof Michael G. Caleb.

Why did you choose to come to Singapore?
Mr Ahmed was advised by his doctor in Bangladesh to have an angiogram done due to his heart problems. They had gotten good feedback from friends who had received healthcare treatment (e.g., Coronary Artery Bypass) in both Bangkok and Singapore. However, his family preferred for him to come to Singapore for treatment.

Mr Ahmed opted to receive his angiogram at the National University Heart Centre, Singapore (NUHCS) even though several of his friends received medical treatment in either Mount Elizabeth Hospital or Gleneagles Hospital. Several factors contributed to his choice of NUHCS, including recommendation, known professionalism and that it was a teaching hospital.

Coming to NUHCS…
He came to NUHCS on 9th November, 2010 and saw Prof Tan for a consultation. His angiogram was carried out two days later. Following which, three of his arteries were found blocked. This was when Prof Tan referred Mr Ahmed to Prof Caleb. A bypass was suggested to Mr Ahmed as soon as possible.

His bypass was carried out on 20th November. He made a quick recovery and was discharged six days later.

“I find it (the service) excellent. When I was in ICU, Ward 78, the nurses and the attending doctors were very good. I am very grateful to them. People have been friendly to me. I would recommend Prof Caleb to others, my friends and family. He gives confidence, which is very important to patients. He is also very friendly.”

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Mr Djakaria and his family are very thankful for the care and attention that led to his speedy recovery and his good health progress so far.
The first week of November 2010 marked a milestone for the National University Heart Centre with launch of the transcatheter aortic valve implantation programme and the successful therapy of patients with aortic valve stenosis.

Symptomatic aortic valve stenosis (AS) has been conventionally treated with open heart surgery and valve replacement. There is however a group of patients with severe comorbidities who suffer from this disease and are deemed too high-risk to undergo surgery. The development of transcatheter therapies now provides hope for them. The transcatheter heart valve (THV) consists of a stent-like platform (stainless steel or cobalt chromium) with attached valve leaflets fashioned from bovine pericardium. These leaflets are pretreated with an anti-calcification treatment to ensure valve durability (similar to how conventional surgical valves are manufactured). The THV is subsequently crimped onto a balloon catheter to reduce its size and delivered via an 18Fr to 24Fr sheath. There are two main approaches to this procedure. Patients who have adequate femoral artery access (i.e., without significant peripheral vascular disease) can undergo a transfemoral approach while those with small or diseased arteries would require a transapical approach. This involves a limited incision in the left intercostal space to expose the apex of the heart. The THV is then delivered through the cardiac apex. In both procedures, balloon aortic valvuloplasty is first performed, following which the crimped transcatheter heart valve is delivered across the stenosed native valve and deployed by balloon inflation. The diseased native valve leaflets are displaced laterally by the stent struts and the new valve leaflets within the stent begin functioning. Recent clinical data comparing medical treatment versus TAVI showed significant reduction in mortality in patients unable to undergo surgery.

Our transcatheter aortic valve implantation (TAVI) team was built over the past two years. This team consists of two TAVI surgeons, Dr Jimmy Hon and Dr Kristine Teoh; two structural interventionists, Dr Edgar Tay and Dr James Yip; an echocardiologist, A/Prof Poh KK; and a cardiac anesthesiologist, A/Prof Sophia Ang. Dr Edgar Tay and Dr Jimmy Hon trained together for a year in St Paul’s Hospital, Vancouver, BC, Canada, where these techniques were pioneered and perfected. Dr Kristine Teoh worked in the Royal Brompton Hospital in London, UK, which has one of the highest TAVI caseloads in

The availability of TAVI would offer hope for a significant number of patients who may be limited by this disease but unable to undertake high risk cardiac surgery.
Europe. Dr James Yip is an expert structural interventionist who has been a stalwart in the field. A/Prof Poh KK’s expertise in three-dimensional and interventional echocardiography provides excellent imaging capability. A/Prof Sophia Ang is a senior consultant cardiac anesthesiologist who has treated many complex cardiac patients in hemodynamically challenging situations.

The backbone support team consists of dedicated nursing staff from the catheterisation laboratory (headed by Sister Chua Chye Ping), Major OT cardiac nurses (headed by Sr Chin Thai Yew) – both of whom have trained a team of nurses skilled in interventional procedures and surgery, perfusionist (led by Ms Ng Bok Lan), medical technologists (led by Ms Shermaine Fun) and radiographers (led by Mr Noel Navarro). The leadership, administrative and operations staff also supported the team throughout.

The prelude to the launch of the programme included core team training in Vancouver for three days where the team joined in the operating room with the Canadian TAVI team members. This was invaluable especially with regards to patient selection, training in specific techniques, and management of complications. In addition, several training sessions were carried out in the catheterisation laboratory to tackle a variety of complex clinical scenarios to ensure seamless coordination among all the team members (see photo “Training session” on facing page).

On 2nd November 2010, two frail elderly patients (one of whom was 91 years of age) underwent the transapical procedure. A/Prof Jian Ye, a proctor from Vancouver joined the team on the day of the procedure. Both patients had a successful outcome. This was followed by successful TAVI in another two patients via the femoral route on 4th November.

We were privileged to have Prof John Webb, the pioneer of the retrograde transfemoral technique present to proctor during this session.

Up to a third of patients have fatal severe symptomatic aortic valve stenosis but have not undergone therapy due to a multitude of reasons. The availability of TAVI would offer hope for a significant number of patients who may be limited by this disease but unable to undertake high risk cardiac surgery. As of end January 2011, a total of seven patients have undergone the TAVI procedure successfully.
Time does fly; 2011 is right around the corner. To me, 2010 is a wonderful year – many good things happened, in family as well as in work. For family, my wife, Fen-Fang gave birth to our daughter, Yu-Hsi, in August. For work, I was offered a research position to continue my career in science at the newly established Cardiovascular Research Institute (CVRI) in NUHS. During this transitional stage, I received a lot of support from my family and colleagues. This helped me, a newbie, in many aspects. I am truly thankful to all of them.

This year is the first time in nine years that I have a warm and non-freezing Christmas. It is also the first time in many years that I can stay with my loved ones, and not be apart on opposite sides of the world during the holiday season. In 2009, around this time, I was finishing my postdoctoral fellowship, and promoted as an instructor in the Center for Human Genetic Research, in Harvard Medical School and Massachusetts General Hospital, while my wife was working as an assistant professor in the department of Psychology in the NUS. Through my wife, I started to learn that Singapore is promoting its research strength by recruiting world-renowned scholars all over the globe, and building up state-of-the-art research facilities. The result is significant: in recent years, one could easily find excellent research work conducted locally in the leading journals in biomedical fields. During my visits to Singapore in the past couple of years, I have been truly impressed by its scale of modernisation, and especially the multiculturalism. On each visit, I could always find something new in the city. Singapore provides a nice and safe living environment to start a family. Thus, I set my mind on leaving the United States – where I have spent the past nine years pursuing advanced education – and relocate to Singapore, as the long-term plan for my career and family.

My training in Harvard involved the creation of an animal model of the genetic disease familial dysautonomia and investigating its ontogenesis with molecular and genetic approaches. During my stay in Boston, my mentor, Dr Slaugenhaupt, encouraged my pursuit of an independent scientific career and suggested that I should expend my research focuses on the diseases that have high prevalence rates in the general population. Having enjoyed every step of my research training in biomedical sciences, I was looking forward to establishing my research career into the examination of the cellular and molecular mechanisms underlying human diseases. Dr Slaugenhaupt kindly introduced me to one of her research topic interests – Mitral Valve Prolapse (MVP), a disease with a relatively high prevalence rate in the general population, but little knowledge about the underlying mechanisms was revealed. In some way, MVP opened the door for me to locate a career in Singapore. First, through a friend of mine in Boston, I made contact with NUHCS director, A/Prof Tan Huay Cheem, and A/Prof Poh KK. From them, I learned that Prof Mark Richards was heading to Singapore to establish the Cardiovascular Research Institute in 2009. Fortunately, Prof Richards was very interested and open-minded about the MVP research I proposed and offered me the opportunity to pursue this at CVRI.

It has been a wonderful experience for the past four months since I joined the big NUHCS family. I am truly grateful for all the help and advice from senior clinical colleagues, A/Prof Ling, Dr Chan, Dr Lee, A/Prof Poh, and many other clinician researchers. Not to mention Prof Richards, who provides me with a great environment to learn the art of building a multidiscipline research team. I am also grateful to members at CVRI – Dr Liew, Dr Wang, Jenny and Marshall. Their support has been heartwarming to me, and made the transition from Boston to Singapore easier and more manageable. I believe that with the substantial research strength and resources in NUHCS/NUHS/NUS, my journey in Singapore will not only be promising but also fruitful.
“Behind any successful open heart operation is a group of dedicated unsung heroes working tirelessly behind the surgeon.” One such group is the perfusionists within NUHCS.

**Extended Mechanical Circulatory Support in the Cardiothoracic Intensive Care Unit (CTICU)**

A patient undergoing heart surgery requires cardiopulmonary bypass support when the heart and lungs are deliberately incapacitated. Extracorporeal circulation provides crucial life support. During cardiopulmonary bypass, the perfusionists manage the haemodynamic and physiologic parameters, keeping them within normal ranges.

A great majority of cardiac patients are able to tolerate this. However, in patients with more severe comorbidities, it is a challenge. Despite deploying all measures in treating these patients, some will need mechanical assistance when pharmacological support is insufficient.

Patients requiring mechanical support are lodged in the CTICU. The more common form of cardiac assist devices is the intra-aortic balloon pulsation (IABP) pump. Simply put, the “balloon pump”, as it is commonly called, reduces the work for the left ventricle and augments the blood supply to the myocardium, making the heart work in a “happier” environment.

Unfortunately, in a small population of these patients, longer-term circulatory support becomes necessary. Patients with respiratory distress also benefit from this mode of support, allowing the lungs to rest and regain their functions. Extracorporeal Life Support (ECLS) – also known as Extracorporeal Membrane Oxygenation (ECMO) – is a form of extended circulatory support that are employed to treat this group of patients that are afflicted with conditions that compromised the functions of the native heart and/or lungs, thus jeopardising survival.

This kind of support can be instituted in the cardiac catheterisation lab, the operating theatre or in the intensive care units. The Cardiac Surgeons, Cardiac Intensivist, Perfusionists and ICU Nurses work tirelessly together to optimise patients’ condition.

The duration of support can last from a few days to weeks. The length of time tethered to mechanical life support is determined by patient’s turn of events.

Patient may recover or bridged to longer-term devices or heart transplantation. Unfavourable and severe complications may arise that require consideration on the next course of action, including termination, as further support may become meaningless.

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**Chia Lay Hoon**

*Nightingale in the 19th century said, “Nursing is a noble profession, but it is up to you nurses to make it noble”. This is echoed by our own health minister, Mr Khaw Boon Wan, when he mentioned on his blog in June that healthcare is a noble profession. I cannot agree with their statements more but at the same time I found myself thinking: How then can we continue to serve the public and deliver good quality care?*

The MOH Investiture Ceremony of the 2010 National Day Awards for the commendation medal, efficiency medal and the long service award medal was held on 10th of November. I felt honoured to be one of the two NUH recipients for the Commendation Award. As the Master of Ceremony recited the general citation which included providing consistent good service, special performance under difficult circumstances, significant efficiency, competence and devotion to duty, I could not help but wonder whether I have indeed fulfilled all of these core expectations and more. Nevertheless, my heart was full of gratefulness towards the organisation for nominating me for this prestigious award and most importantly, believing in me. I am indeed humbled by the recognition. As I walked up the stage to receive the award, it dawned on me that NUH has given me many opportunities for both personal and professional growth as well as help me to realise my potential. Words are simply inadequate to express my gratitude.

This award has inspired and motivated me to continue to strive for excellence and to give the best of my abilities in all that I undertake in the future.
The 5th Asian Cardiothoracic Surgery Specialty Update Course (ACSSUC) is a course that runs annually between Singapore and Hong Kong since 2006. Organised jointly by the Royal College of Surgeons of Edinburgh, the National University Heart Centre, Singapore and the Chinese University of Hong Kong, the 5th ACSSUC was held at NUHS on 19th–20th November 2010. The two-day course consisted of lectures, Q&A sessions and interactive seminars on common and complex cardiothoracic surgical conditions. It was preceded by three surgical skills workshops that were held at the Khoo Teck Puat Advanced Surgery Training Centre (ASTC) on 17th–18th November 2010, followed by a workshop on aortic dissection and thoracic aortic endovascular aneurysm repair (TEVAR) held at the Copthorne Waterfront Hotel on 21st November 2010. Over these five days, 46 local and international experts shared their knowledge and experience in a friendly, informal and interactive setting.

Our keynote speaker was the Director of the German Heart Institute in Berlin, Prof Roland Hetzer, who shared his hospital’s 30-year experience in Mechanical Circulatory Support and in Thoracic Aortic Surgery. A new feature for this year was the involvement of Mr Timothy Jones, Consultant Paediatric Cardiac Surgeon from the Birmingham Children’s Hospital, UK, who conducted the workshop on Aortic Root Enlargement for AVR, spoke on Congenital Heart Disease in Paediatric and Adult patients, and helped to run the ECMO and Cardiopulmonary Bypass interactive sessions. Other highlights included the Endoscopic Vein Harvesting (EVH) workshop, which provided delegates with hands-on experience of EVH and concluded with a debate on EVH versus conventional vein harvesting for CABG; and the Video-Assisted Thoracic Surgery (VATS) workshop which provided delegates with VATS operating experience on live, anaesthetised animals.

Our 33 local faculty – from NUHS, NHC, NCC, TTSH and Mt Elizabeth – represented Cardiothoracic & Vascular surgery, Anaesthesia, Cardiology, Neurology, Oncology, Nursing, Perfusion and Physiotherapy; and were joined by 13 Cardiothoracic surgeons from Europe and Asia. The 5th ACSSUC, held at the NUHSTower Block Auditorium, was attended by 126 delegates (70 doctors, and 56 nurses and allied health professionals) from Asia, Australia, Middle East and Europe. In addition, the pre-course skills workshops in ASTC attracted 54 delegates, while the post-course workshop hosted 30 delegates. Over the five days, there was a unique opportunity for faculty and delegates – from the UK, Germany, Austria, Iran, Yemen, Qatar, India, Bangladesh, China, Hong Kong, Taiwan, Vietnam, Thailand, Malaysia, Singapore, Brunei, Indonesia, Philippines and Australia – to engage through lectures with Q&A sessions, during hands-on workshops and interactive seminars, and over coffee & lunch breaks and at the Welcome Reception held at the Studio M Hotel.

As an event with a high ratio of faculty to delegates, high-quality evidence-based teaching, and good interaction and dialogue, the ACSSUC goes from strength to strength. This year’s course was described as the “best ever” and much of the credit and thanks must go to the team behind the scene in CTVS, ASTC and NUHS, as well as to the sponsors who supported the 5th ACSSUC.
On 6th November 2010, the NUHCS hosted a delegation of about 50 physicians and surgeons from the United States who were here to attend the Heart Failure Symposium of the 19th International Cardiovascular Symposium. This was co-organised with the Cardiovascular Institute of Sarasota Foundation for Education and Research, Sarasota Memorial Healthcare Foundation and the Cardiovascular Division of the University of South Florida, USA. The delegation had visited several ASEAN cities prior to stopping over in Singapore. 70 local delegates also attended the symposium, which was held at the auditorium of the Clinical Research Centre, National University of Singapore. The theme for the Symposium was “Advances in the Past 12 Months in the Diagnosis and Management of Heart Failure”. A distinguished faculty of cardiovascular experts delivered excellent lectures on various contemporaneous topics related to the failing heart. The Symposium was jointly chaired by Prof M. El Shahawy from the Universities of Florida and South Florida, and Dr Raymond Wong, Consultant Cardiologist at the NUHCS.

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The Symposium was opened by a welcome speech from Prof M. El Shahawy, who was also the Programme Director of the Symposium. World-renown heart failure expert Prof Jay Cohn then delivered the first lecture on strategies to prevent heart failure. He explained the various pathophysiological mechanisms leading to heart failure and proposed strategies including healthcare and population approaches that might prevent or slow the progression of heart failure. This was followed by a lecture on how hypertension leads to heart failure by Prof Elizabeth O. Ofili from the Morehouse School of Medicine. Prof Anne B. Curtis from the University of Buffalo and Past President of the Heart Rhythm Society explained how early cardiac resynchronisation therapy reduces death and heart failure events, drawing from insights from the MADIT-CRT and other trials. She elegantly presented evidence to support early CRT in milder degrees of chronic heart failure and how this could prevent progression of disease.

Following the tea-break, Prof Chamberlin Obialo, who is Chief of Nephrology Section at the Morehouse School of Medicine, spoke on the cardio-renal syndrome and the controversies surrounding the benefits of statins in patients with end-stage renal disease. Prof U. Joseph Schoepf, Director of CT Research and Development at the Medical University of South Carolina, showed the latest developments in cardiac computed tomography, including myocardial perfusion imaging, hybrid CT and SPECT imaging, illustrating his lecture with beautiful images. Dr Thomas Kelly, cardiovascular surgeon at the Sarasota Memorial Hospital, presented his experience with robotic coronary artery bypass surgery. The final lecture was presented by Dr Low Lip Ping, Chairman Emeritus of the Singapore Heart Foundation, on the implications of the resting heart rate on cardiovascular prognosis, and the results of the recently published SHIFT trial demonstrating the benefits of the heart rate reducing agent ivabradine in chronic heart failure.

The Symposium concluded with a scrumptious lunch, following which our overseas visitors departed for an afternoon of sightseeing, shopping and sampling of our delectable local delights in the Lion City. We would like to thank Servier Singapore for their generous support of this Symposium.
A cardiac positron emission tomography (PET) scan is a relatively new nuclear imaging modality that has gained increasing importance in evaluating coronary flow reserve. It is currently considered the most reliable tool for the identification of myocardial viability. PET radionuclides reach a more stable configuration by the emission of a positron which is positively charged particles with the same rest mass as electrons. When a positron collides with an electron, two 511 keV gamma rays are emitted. These emitted photons are nearly collinear, travelling in opposite directions, almost exactly 180 degrees apart. Clinical studies have shown that PET imaging is more accurate than other stress modalities such as treadmill ECG stress testing and single photon emission computed tomography (SPECT). In particular, PET imaging has an excellent diagnostic accuracy rating in identifying coronary heart disease, thus avoiding false positives that result in healthcare resources wastage and patient anxiety.

In PET perfusion imaging, radiotracer such as rubidium, radioactive ammonium or oxygen is commercially utilized to delineate the territory and quantify myocardial uptake, giving accurate information about coronary flow status and blood flow quantitation. These tracers are broken down to release positrons which get annihilated when hitting an electron to produce coincidental Gamma waves. Latter are captured by PET ring-camera for further electronic processing.

In PET metabolic imaging, 18F-fluoro-2-deoxyglucose (FDG) is taken up by ischemic but live myocardium after an overnight fast to indicate viability. Depending on several permutations of perfusion-metabolic mismatch, hibernation, stunning, infarction or ischemia can be determined in definitive terms. As modern PET machines are hybrid CT-PET, attenuation correction (via CT) of the images are superior to SPECT.

In NUHCS, PET metabolic imaging for myocardial viability was launched in May 2010 to complement the comprehensive non-invasive techniques of coronary and myocardial evaluation. To date, eight scans have been performed with good patient tolerability (10–15 minutes per scan) and excellent image quality for interpretation (see case illustration). It has proven to effectively predict whether to revascularise patients with severe LV systolic dysfunction (if at least 25% of viable LV myocardium), or to pursue medical/device therapy or transplantation in non-viable LV.

There are promising future applications that involve molecular imaging of cardiac target receptors, which will further enhance the clinical utility of PET and hybrid imaging with CT and magnetic resonance imaging.

52-year-old man, diabetic and smoker, admitted for evolved anterior myocardial infarction. Coronary angiogram showed triple vessel disease, and echocardiogram showed marked global regional wall motion abnormality with LV ejection fraction 25%.

Rest nitrate Tc-99m myocardial perfusion imaging (upper panels) showed poor to nil tracer uptakes in the septal, anterior and inferior segments. In particular, hot bowel loop inferiorly may have falsely reduced the radiotracer activity inferiorly.

18F-FDG PET viability scan (lower panels) showed preserved metabolic activity in all LV segments except apex and basal septum. This perfusion-metabolic mismatch illustrates hibernating and viable myocardium.

He underwent coronary artery bypass surgery successfully with uneventful recovery.
happenings

Visit by Chinese Medical Association
23 July 2010

Dept of CVTS’ Christmas Party 2010
15 December 2010

Visiting Professorship
21 January 2011
A/Prof Tan Huay Cheem is conferred Visiting Professorship by Fujian University in Fujian province, China. This is the 4th chinese visiting professorship that he has received.

Nanjing Delegates Visit
1 July 2010

Cardiac Dept Family Day
21 November 2010
abstracts

17th INTERNATIONAL CONFERENCE ON EMERGENCY MEDICINE (ICEM 2010), SINGAPORE, JUNE 2010

12th ANNUAL CONGRESS OF ASIAN SOCIETY FOR VASCULAR SURGERY (ASVS), KYOTO, JAPAN, JUNE 2010
1. Endovascular intervention for salvage of failing hemodialysis access—May KK, Ho P
2. Limb Salvage in Peripheral Arterial Disease Patients Managed by Endovascular First Approach—May KK, Sidhu HR, Chua SY, Robless PA, Ho P
3. Thrombolytic Therapy for Salvage of Embolic Complications Secondary to Iliac Angioplasty—Lee YY, Tan GL, Ho P

6th ASIAN INTERVENTIONAL CARDIOVASCULAR THERAPEUTICS (AICT), SINGAPORE, JULY 2010

INTERNATIONAL MEETING OF THE ONAISIS CARDIAC SURGERY CENTER, ATHENS, GREECE, AUGUST 2010

EUROPEAN SOCIETY OF CARDIOLOGY 2010, 28 AUGUST–1 SEPTEMBER 2010, STOCKHOLM, SWEDEN
1. Is left ventricular diastolic dysfunction in paradoxical low-flow severe aortic stenosis with preserved left ventricular ejection fraction worse than in normal-flow severe aortic stenosis?—Soo WM, Ling LH, Chan MY, Loh JP, Poh KK
2. Reduced change rate of normalized left ventricular systolic wall stress in patients with heart failure and normal ejection fraction—Zhong L, Poh KK, Lee LC, Le TT, Tan RS

American Heart Association Scientific Sessions 2010, Illinois, United States, November 2010
2. Correlation between high density lipoprotein-cholesterol and remodeling index in patients with coronary artery disease: An intravascular ultrasound study. Lee CH, Tai BC, Lim GH, Chan MY, Low AF, Tan KC, Chia BL, Tan HC.
3. Radial versus femoral access in primary percutaneous coronary intervention: a matched-pairs analysis in an Asian cohort. Agahari F, Lee CH, Xia HY, Tan HC, Yeo TC, Teo SG, Low AF, Chan M.

publications

2. Peptides. 2010 Aug; 31(8):1540-5. Regional vascular response to ProAngiotensin-12 (PA12) through the rat arterial system. Prosser HC; Richards AM; Forster ME; Pemberton CJ.
3. J Am Coll Cardiol. 2010 May; 55(19):2062-76. Mid-region pro-hormone markers for diagnosis and prognosis in acute dyspnea: results from the BACH (Biomarkers in Acute Heart Failure) trial. Maisel A; Mueller C; Nowak R; Peacock WF; Landsberg JW; Ponikowski P; Mockel M; Hogan C; Wu AH; Richards AM; Clapton P; Filippatos GS; Di Somma S; Anand I; Ng I; Daniels LB; Neath SX; Christensen R; Potocki M; McCord J; Terracciano G; Kremastinos D; Hartmann O; Haehling S; Bergmann A; Morgenthaler NG; Anker SD.


6. Eur Heart J. 2010 Jun; 31(15):1881-1889. Age-dependent values of N-terminal pro-B-type natriuretic peptide are superior to a single cut-point for ruling out suspected systolic dysfunction in primary care. Hildebrandt P; Collinson PO; Doughty RN; Fuat A; Gaze DC; Gustafsson F; Januzzi J; Rosenberg J; Senior R; Richards AM.


8. Metabolism. 2010 Jun; 59(6):796-801. Effect of nutrition on plasma C-type natriuretic peptide forms in adult sheep: evidence for enhanced C-type natriuretic peptide degradation during caloric restriction. Prickett TC; Ryan JF; Wellby M; Barrell GK; Yandle TG; Richards AM; Espiner EA.


14. Circ Cardiovasc Genet. 2010 Jun; 3(3):286-93. A common variant at chromosome 9P21.3 is associated with age of onset of coronary disease but not subsequent mortality. Ellis KL; Pilbrow AP; Frampton CM; Doughty RN; Whalley GA; Ellis CJ; Palmer BR; Skelton L; Yandle TG; Palmer SC; Troughton RW; Richards AM; Cameron VA.


16. Circulation. 2010 Jul. 122(3): 255-64. B-Type Natriuretic Peptide Signal Peptide Circulates in Human Blood. Evaluation as a Potential Biomarker of Cardiac Ischemia. Sirlinardena M; Kleffmann T; Ruygrok P; Cameron VA; Yandle TG; Nichols MG; Richards AM; Pemberton CJ.


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32. J Card Fail. 2010 Aug; 16(8):635-40. Clinical significance of endogenous vasoactive neurohormones in chronic systolic heart failure. Tang WH; Shrestha K; Martin MG; Borowski AG; Jasper S; Yandle TG; Richards AM; Klein AL; Troughton RW.

33. J Am Coll Cardiol. 2010 Sep; 56(11):845-54. Global Cardiovascular Reserve Dysfunction in Heart Failure With Preserved Ejection Fraction. Borlaug BA; Olson TP; Lam SP; Flood KS; Lerman A; Johnson BD; Redfield MM.


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new doctors on board

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awards

18th ASEAN Congress of Cardiology
Young Investigator’s Award (First prize)
Dr Joshua Loh

congrats!

Dr Joshua Loh and Dr Kang Giap Swee
have been promoted from Registrar to Associate Consultant

Dr Mark Chan
has been promoted from Associate Consultant to Consultant